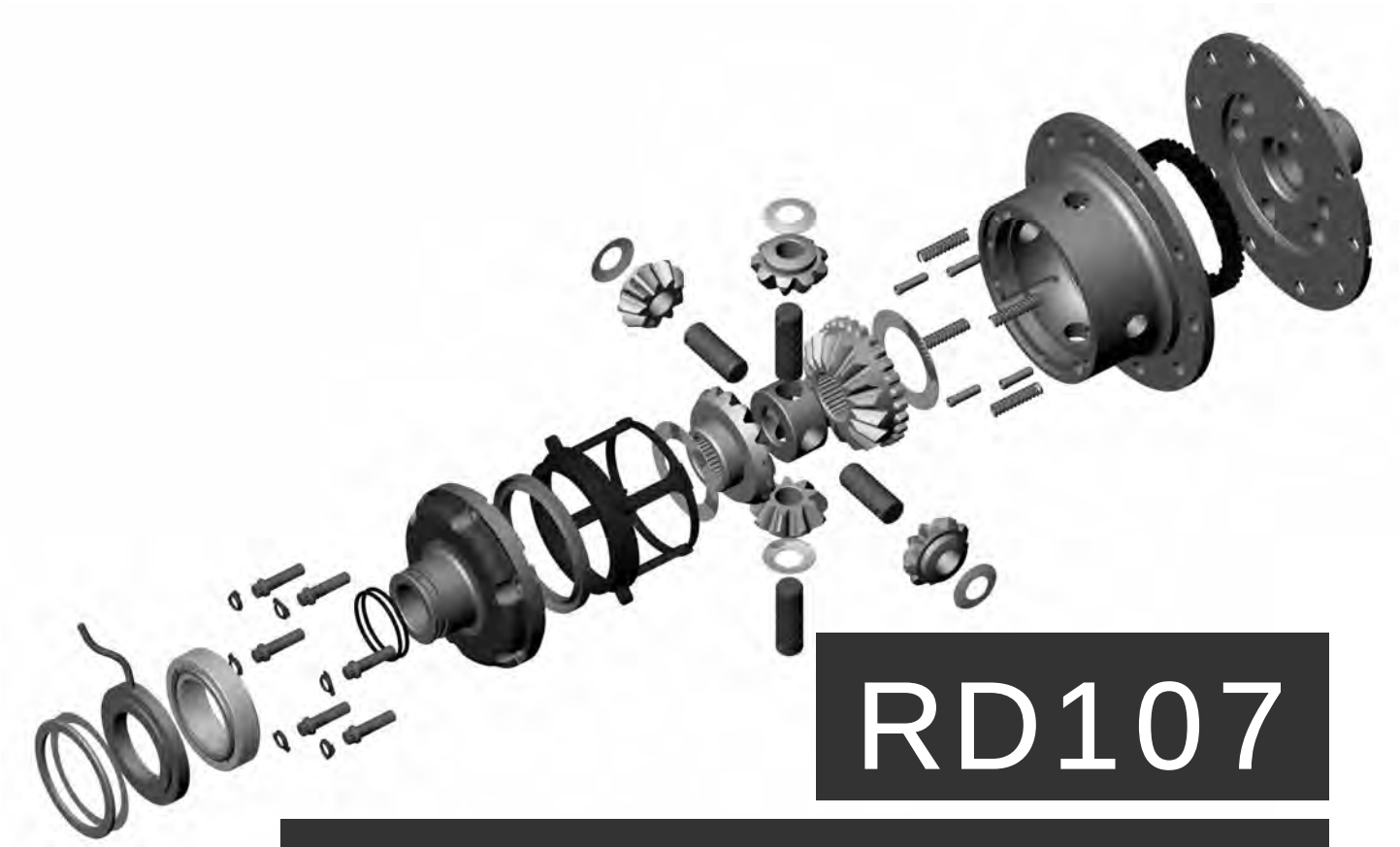
ARB AIR LOCKER

AIR OPERATED LOCKING DIFFERENTIALS

INSTALLATION GUIDE



RD107

NISSAN C200/R200A, 29 SPLINE

Part No. 2102107
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1 Introduction

IMPORTANT :

BEFORE ATTEMPTING TO DISMANTLE YOUR VEHICLE FOR THIS INSTALLATION, PLEASE READ THIS INSTALLATION GUIDE IN ITS ENTIRETY, AS WELL AS ALL APPLICABLE SECTIONS OF YOUR VEHICLE MANUFACTURER'S SERVICE MANUAL.

1.1 Pre-Installation Preparation

This booklet is to be used in conjunction with your vehicle manufacturer's service manual. ARB endeavors to account for every possible variation in vehicle model when publishing its installation guides, and guides are updated regularly as new model information becomes available, however, the rapid and globally varied release of some vehicles makes it difficult to insure that your vehicle model has been accurately accounted for. In the case of any technical discrepancies between this guide and your service manual, we strongly advise that you adhere to the specifications and techniques as documented in your service manual.

Although your *ARB Air Locker* comes complete with all the step by step instructions you will need to supplement your vehicle manufacturer's service manual and install your new differential, ARB recommends that you have your *Air Locker* installed by a trained professional. Many ARB distributors around the world have been fully instructed in *Air Locker* installations by ARB, and have gained a wealth of experience and skill from years of performing similar installations.

Once you begin this installation your vehicle will be immobile until all steps of the installation are complete. Make sure your *Air Locker* kit is the correct model for your vehicle and that it contains all of the parts listed on back cover of this booklet. Also be sure you have appropriately equipped yourself with all the necessary tools, parts, and materials to complete this installation (see section 1.2 *Tool-Kit Recommendations*), and that you have allowed for an appropriate amount of vehicle down time.

HINT : **Place a ✓ mark inside each of the ☐ symbols as you complete each step. It is very important NOT to miss any of the steps!**

1.2 Tool-Kit Recommendations

Below is a list of tools and supplies you may need to complete this installation. Requirements for your vehicle may vary. Please consult your vehicle service manual for additional recommendations.

1.2.1 Tools

- ☐ Standard automotive sizes (metric and/or imperial) of sockets, wrenches, Alan keys, and drills.
- ☐ A dial indicator or other suitable measuring tool for checking ring & pinion backlash.
- ☐ A standard automotive feeler gauge.
- ☐ Automotive brake tubing cutters to cut the steel tubing.
- ☐ A razor knife to cut the nylon tubing.
- ☐ A differential housing spreader, to facilitate removal of the carrier.
- ☐ A torque wrench. (See vehicle service manual for required torque range.)
- ☐ A lubricant drain reservoir.
- ☐ Suitable measuring tools to measure a differential for pre-load and/or backlash shimming. (See Section 3 *Bench Measurement*)
- ☐ A 11.2mm [7/16”] drill and ¼” NPT tap for bulkhead fitting installation.
- ☐ An automotive bearing puller (2 jawed is recommended) or a differential carrier bearing puller.
- ☐ A bearing press or arbor press.

1.2.2 Supplies

- ☐ Thread lubricant/sealant compound (e.g., LOCTITE #567)
- ☐ Thread locking compound (e.g., LOCTITE #272)
- ☐ Either a replacement gasket, or gasket sealant, for your differential cover.
- ☐ A sufficient volume of differential oil to completely refill your housing. (see the *ARB Air Locker Operating and Service Manual* for recommended lubricants)
- ☐ A soap and water mixture to test for air leaks.
- ☐ Teflon paste.
- ☐ A selection of differential bearing shims to set-up pre-load and backlash. (See section 3 *Bench Measurement*)

2 Removing the Existing Differential

2.1 Vehicle Support

- ☐ Safely secure the vehicle on a hoist. We recommend supporting the vehicle on a chassis hoist to keep the differential area at a convenient working height and to leave the wheels and axles free to be rotated and removed.
- ☐ Once supported off the ground, release the parking brake and leave the vehicle in neutral. Chock the wheels if necessary.

2.2 Differential Fluid Drain

- ☐ Clean around the differential cover plate seal to prevent dirt from entering the differential.
- ☐ Position a fluid drain reservoir under the differential.
- ☐ Remove the differential drain plug and completely drain all differential fluid.
- ☐ Once drained, reinstall the drain plug finger tight to prevent drips coming out of the housing and dust getting in.

HINT : **This is a good time to check for metal particles in your oil and in the bottom of the housing which may indicate a worn bearing or differential component.**

2.3 Removing the Axles

- ☐ Remove the axles as indicated in your vehicle manufacturer's service manual. In the case of IFS differential assemblies this will require the removal of the entire assembly first.

IMPORTANT :

Collision damage or heavy off-road use of your vehicle in the past may have resulted in some degree of bending in the axle. Any misalignment of the axle tubes may result in excessive wear and/or failure of your differential and axle shafts. ARB strongly recommends that you have your axle assembly inspected for concentricity and straightness before installing your *Air Locker*.

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2 Removing the Existing Differential

2.4 Marking the Bearing Caps

☐ Using a pointed center punch, gently mark the bearing caps in a way that will enable you to know which cap is ‘LEFT’ and which cap is ‘RIGHT’, which way is ‘UP’ and which way is ‘DOWN’. (Fig.1.)

HINT : **Many installers choose to make one punch mark on the left hand side of the left hand bearing cap and one similar punch mark on the housing at close proximity to the cap mark. The right hand side is then designated with two punch marks on the right hand side of the cap and two similar punch marks on the housing.**

Figure 1.

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2.5 Checking the Current Backlash Amount

IMPORTANT:

This step is a precautionary measure recommended by ARB due to the fact that some after market ring and pinion sets have been manufactured to run with different backlash settings than those specified by your vehicle manufacturer. Although ARB must recommend you set backlash according to your service manual guidelines, we also advise that you compare the backlash measurements taken here to the recommended backlash settings in your vehicle service manual. Measurements found to be outside of your service manual recommendations may indicate the need to deviate from those settings in order to achieve quiet running with a good contact mark.

Refer to your vehicle service manual or your local authorized ARB installer for more information.

☐ Set a depth indicator on one of the ring gear teeth as in figure 2.

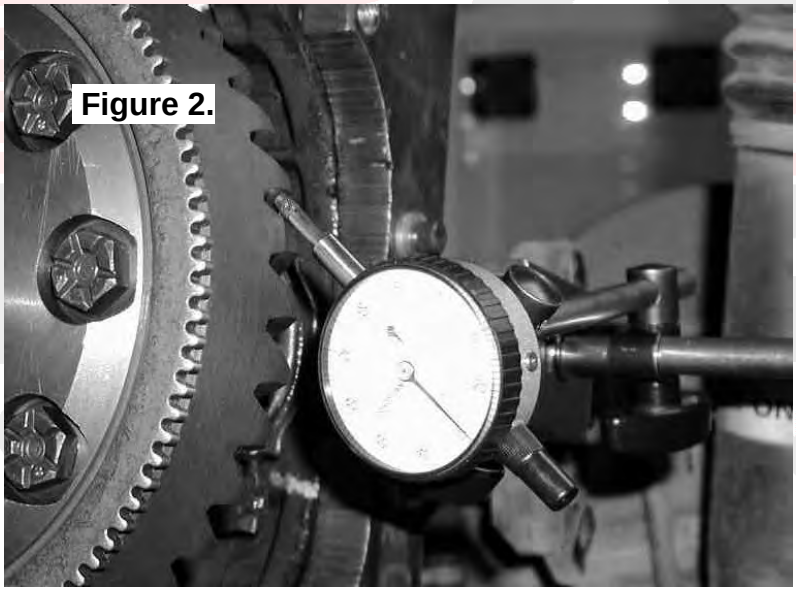

Figure 2.

☐ While supporting the pinion gear by holding the drive shaft, rotate the differential in both directions while observing the maximum variation in depth from the indicator (i.e., the highest value minus the lowest value). This value is referred to as the ring and pinion backlash.

☐ Rotate the differential center 90° and measure again for accuracy.

☐ Record the average of all measurements.

2 Removing the Existing Differential

2.6 Spreading the Differential Housing

IMPORTANT:

Spreading the differential housing with a differential case spreader is a step which is critical to set up bearing pre-load when a differential is installed. Improper pre-load will result in undue bearing wear, increased stresses in the differential center, increased running noise, and ultimately, ring and pinion gear damage.

☐ Unbolt and remove the bearing caps from the differential housing.

HINT : **Be sure not to mix up the left and right hand bearing caps. Later it will be necessary to know which cup came from which bearing and which shim came from which side.**

☐ Carefully spread the housing (Fig.3.) enough to remove the differential center. (Refer to your vehicle's service manual).

NOTE : **Do not spread the housing more than 0.50mm [0.020"].**

☐ Once the housing has been adequately spread, the differential may be removed by pulling forward on the differential carrier.

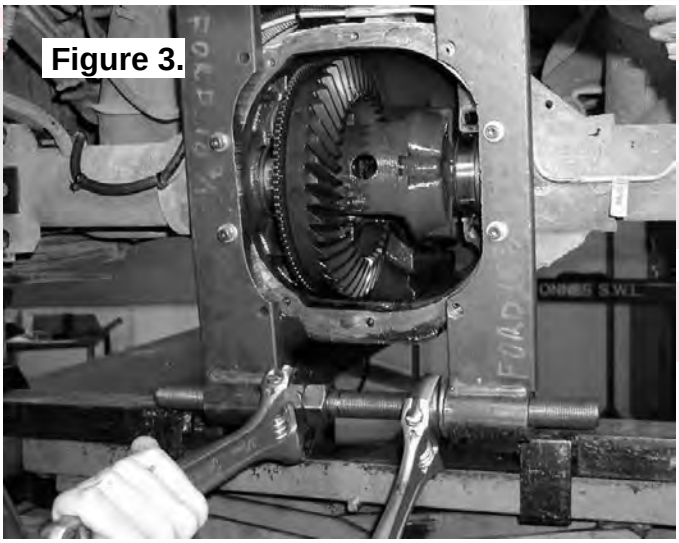

Figure 3.

NOTE : **Keep the shims separated so that they can be identified as to which end of the differential they came from.**

☐ Immediately release all spreader tension once the differential center has been removed.

3 Bench Measurement

3.1 Measurement for Pre-Load Shimming

When fitting an ARB *Air Locker*, a variable shim pack (supplied) is used in conjunction with the original bearing on the right hand side of the differential (as pictured in Fig.11.) in order to achieve the correct ring and pinion backlash and carrier bearing pre-load once the *Air Locker* has been installed. Because of this, the original shim from this side will not be reused.

The original bearing type and shim type are used on the left hand (ring gear) side of the *Air Locker* (as pictured in Fig.5.). Measurements will, however, need to be taken to determine the correct shim thickness for this side in order to reproduce a similar backlash and pre-load to that of your existing differential.

The large spacer on the outside of the ring gear side shim must be retained and re-fitted when the *Air Locker* is installed.

NOTE : **Keep the shims separated so that they can be identified as to which end of the differential they came from.**

- ☐ Secure the differential to a work bench.
- ☐ Remove the bolts that hold the ring gear in place.
- ☐ Using a plastic or copper hammer, tap in a circle around the ring gear to separate it from the differential carrier.
- ☐ Remove the original bearings from the differential center using a bearing puller.
- ☐ Using a caliper or similarly accurate measurement method (i.e., able to take accurate measurements within 0.04mm [0.0015”]), hold the bearing cup in place and measure the distance from the shoulder of the bearing journal to the ring gear mounting face (shown as ‘**A**’ in Figure 4.) and record this measurement as ‘**A**’.
- ☐ Measure the thickness of the shim (**not the spacer**) removed from the ring gear side of the differential carrier (shown as ‘**B**’ in Figure 4.) and record this measurement as ‘**B**’.
- ☐ Measure the distance from the *Air Locker* bearing shoulder to the ring gear mounting face (shown as ‘**C**’ in Figure 5.) and record this measurement as ‘**C**’.

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3 Bench Measurement

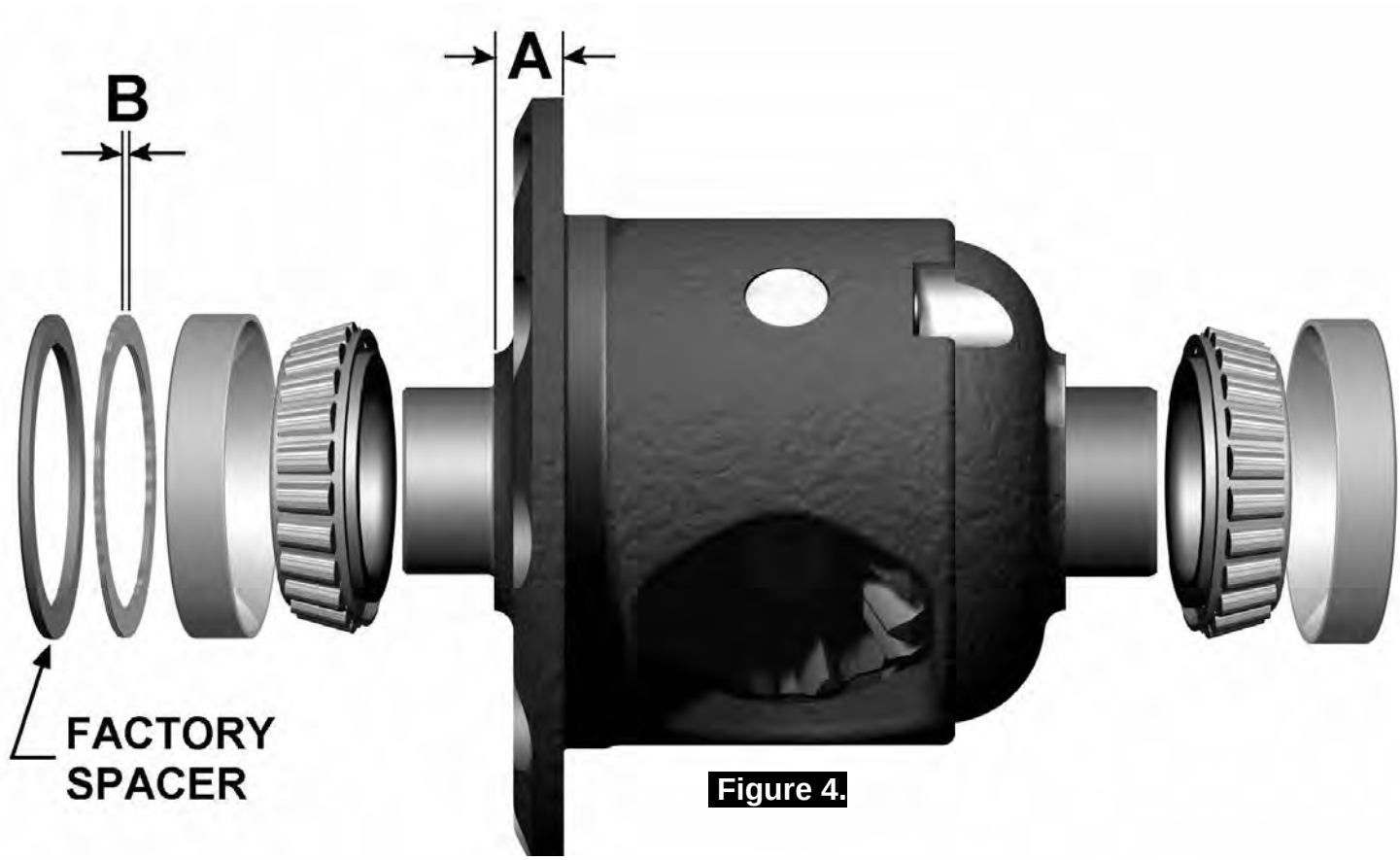

Figure 4.

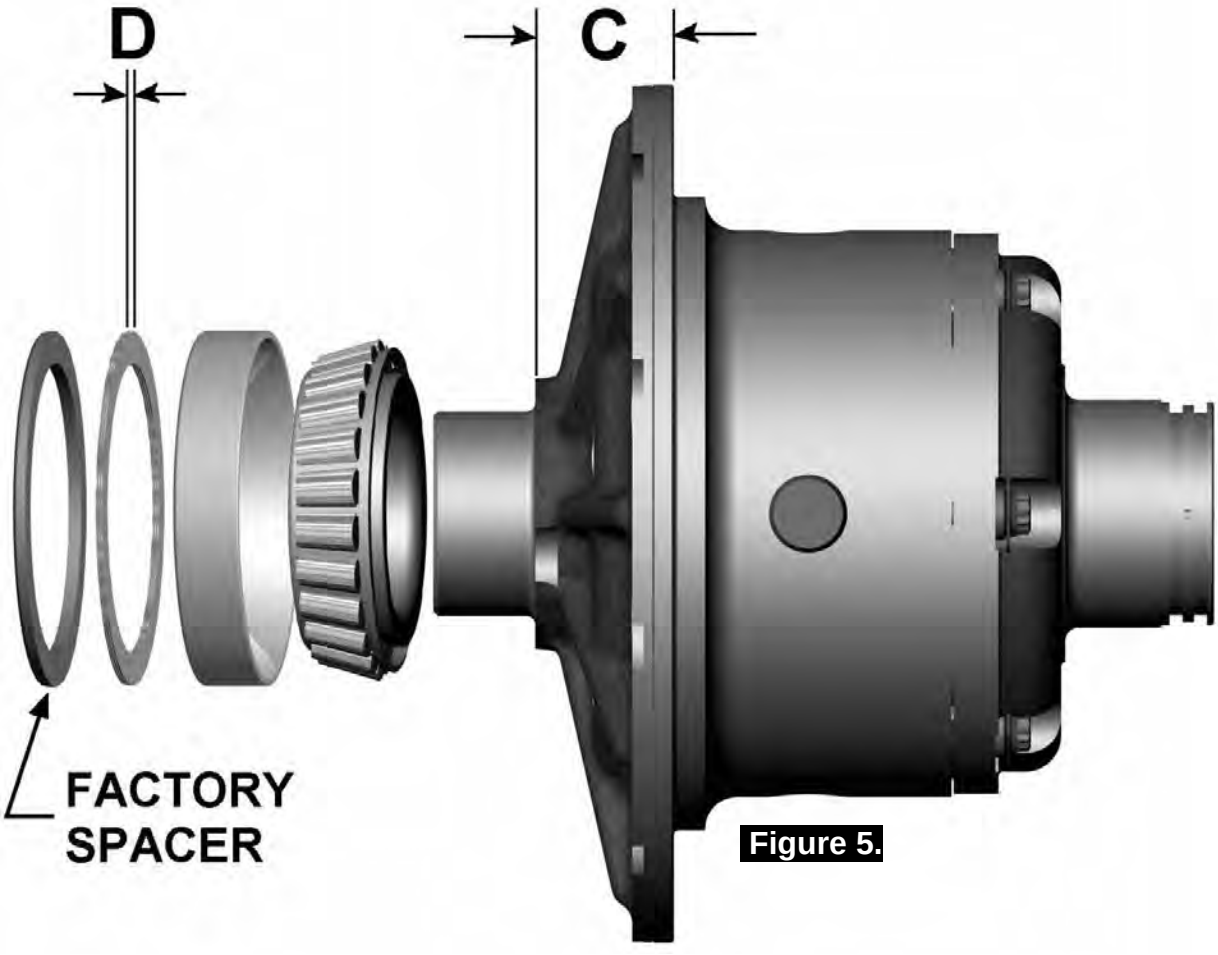

Figure 5.

3 Bench Measurement

3.2 Calculation & Selection of Shims

The thickness of the shim pack required for the *Air Locker* (shown as '**D**' in Figure 5.) can now be determined by substituting the measurements taken into the following equation.

$$A + B - C = D$$

HINT : **If your calculations are correct then the following equation will also be true:**

$$A + B - C - D = ZERO$$

To make a shim pack to match the measurement you calculated as '**D**' you can:

- Either machine the ring gear side shim, or purchase a new one of the correct thickness from your Nissan dealer.
- Add shims between the master shim and the seal housing.
- Use a universal shim kit available from most drive train specialists.

NOTE : **Never re-use any shims which are damaged or worn.**

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4 Installing the Air Locker

4.1 Installing the Carrier Bearings

- ☐ With the *Air Locker* well supported in an arbor press, apply a thin film of high pressure grease to the ring gear side bearing journal, and assemble the newly established shim pack onto the bearing journal.
- ☐ Press the tapered roller bearing cone onto the bearing journal of the differential carrier until the bearing seats firmly against the shim pack.

NOTE : **Never re-use any bearings which are damaged or worn.**

- ☐ Invert the *Air Locker* and apply a thin film of high pressure grease to the seal housing side bearing journal.
- ☐ Press a second bearing cone onto the opposite bearing journal, taking care not to damage the O-ring grooves. (Figure 6.)

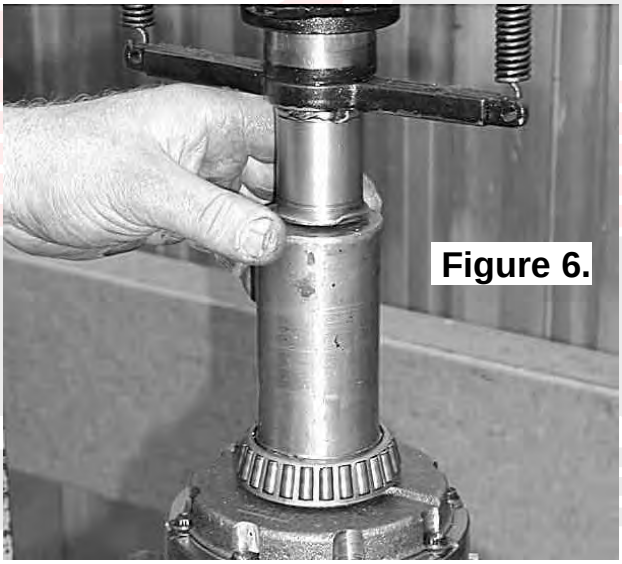

Figure 6.

NOTE : **Do not add any shims between the seal housing bearing and the bearing seat.**

4.2 Installing the Thrust Block

IMPORTANT:

This model of *Air Locker* was manufactured to replace Nissan differentials which employ one of three distinctly different methods of retaining the axle shafts.

1 Full Floating Axles

2 Semi-Floating Axles

3 IFS Bolt-Retained Axle Stubs

Depending on which axle type you have, you may be required to install one of the thrust blocks included with the *Air Locker* kit before mounting the ring gear.

4.2.1 Full Floating Axles

Full-floating axles are completely supported and therefore do not require a thrust block at all.

4.2.2 Semi-Floating Axles

Semi-floating axles are only retained inward at the wheel end of the axle shaft and are supported in the center of the axle assembly by a thrust block.

- ☐ With the Air Locker positioned with the cylinder cap bolt heads facing down, cut the cable ties and remove the flange cap from the assembly.
- ☐ Remove the splined side gear from the assembly.
- ☐ Insert the thrust block (ARB Part # 110501) into the hole in the center of the spider block.
- ☐ Re-assemble the side gear and the flange cap.

4.2.3 IFS Bolt Retained Axle Stubs

IFS assemblies retain one of the axle stubs with a long bolt through the center of the shaft. This requires that a threaded thrust block be installed into the side gear of the Air Locker.

- ☐ With the Air Locker positioned with the cylinder cap bolt heads facing down, cut the cable ties and remove the flange cap from the assembly.
- ☐ Remove the splined side gear from the assembly.
- ☐ Insert the threaded thrust block (ARB Part # 110401) through the hole in the center of the spider block and into the spline of the side gear. (Refer to Fig.7.)

Figure 7.

- ☐ Using an aluminum or hard plastic drift, knock or press the thrust block into the spline until it reaches its maximum depth. (Fig.8. & 9.)

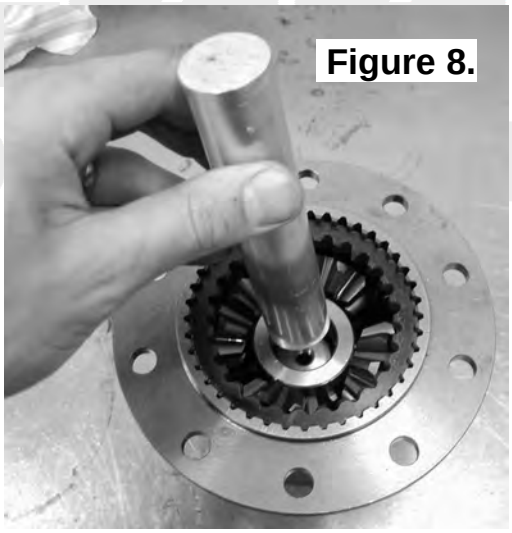

Figure 8.

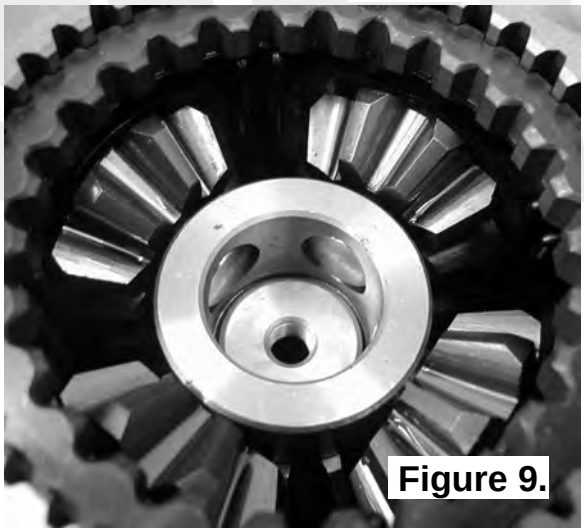

Figure 9.

- ☐ Re-assemble the side gear and the flange cap.

4.3 Mounting the Ring Gear

IMPORTANT:

Your *Air Locker* was manufactured to replace differentials using 12mm [0.472”] diameter ring gear bolts. Ring gears with smaller bolts should ONLY be installed using cylindrical spacers to reduce the clearance between the bolts and the *Air Locker* flange. (not supplied)

- ☐ Apply a thin film of high-pressure grease to the ring gear shoulder of the *Air Locker* to prevent seizing.
- ☐ Thoroughly clean any thread locking compound or other foreign matter from the holes of the ring gear, the threads of the ring gear bolts, and the mating surfaces of the ring gear and the *Air Locker* flange.

NOTE : **Rubbing the ring gear mounting face with a flat oil stone before installation will remove any high spots around the threads.**

- ☐ Heat the ring gear to between 80 and 100°C (175 - 212°F) in an oven or in hot water to slightly expand the gear and facilitate assembly.

NOTE : **NEVER HEAT GEARS WITH A FLAME! This could damage the hardened surface of the gear and result in premature wear or failure.**

- ☐ Dry the ring gear with compressed air (if wet), paying particular attention to the threaded holes.
- ☐ Install the ring gear onto the *Air Locker* by aligning the holes in the flange with the tapped holes in the ring gear, then gently tapping it around in a circle with a plastic or copper hammer.

NOTE : **Avoid using the bolts to pull down the ring gear as this puts excess strain on the bolts and the differential flange.**

- ☐ Apply a thread locking compound to the thread of each ring gear bolt before inserting it.

NOTE : **Do not apply threading compound directly into the threaded hole as this could prevent the bolt from reaching its full depth.**

- ☐ Tighten the ring gear bolts in a star pattern with a torque wrench according to your vehicle manufacturer’s specified torque.

4.4 Drilling and Tapping the Bulkhead Port

A port must be drilled and tapped through the differential housing to allow the seal housing tube through the housing to connect with the air line from the air compressor.

- ☐ Mark a spot for the bulkhead port on the right hand (seal housing) side toward the top of the differential housing that is in an area that will be well clear of the ring gear, the differential, and any other obstructions that may snag the seal housing tube.
- ☐ Cover the drive pinion and axle tube areas with a rag to protect them from metal filings.

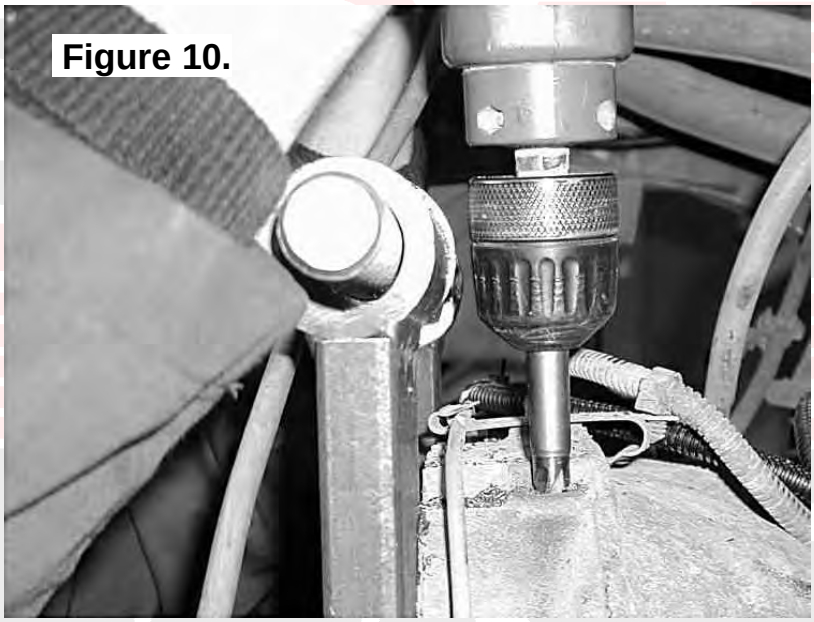

Figure 10.

- ☐ Drill through the housing square to the outside surface using an 11.2mm [7/16”] drill. (Fig.10.)
- ☐ Tap the hole from the outside using a ¼’’ NPT tapered pipe thread tap.
- ☐ Remove any sharp edges from the hole that may chip-off and fall into the housing.
- ☐ Very carefully remove rags and inspect with a service light inside the housing to insure no metal filings are left behind.

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4.5 Assembling the Differential Carrier

☐ Relieve all tension on the housing spreader.

☐ Place the bearing cup over the bearing cone (Figure 11.).

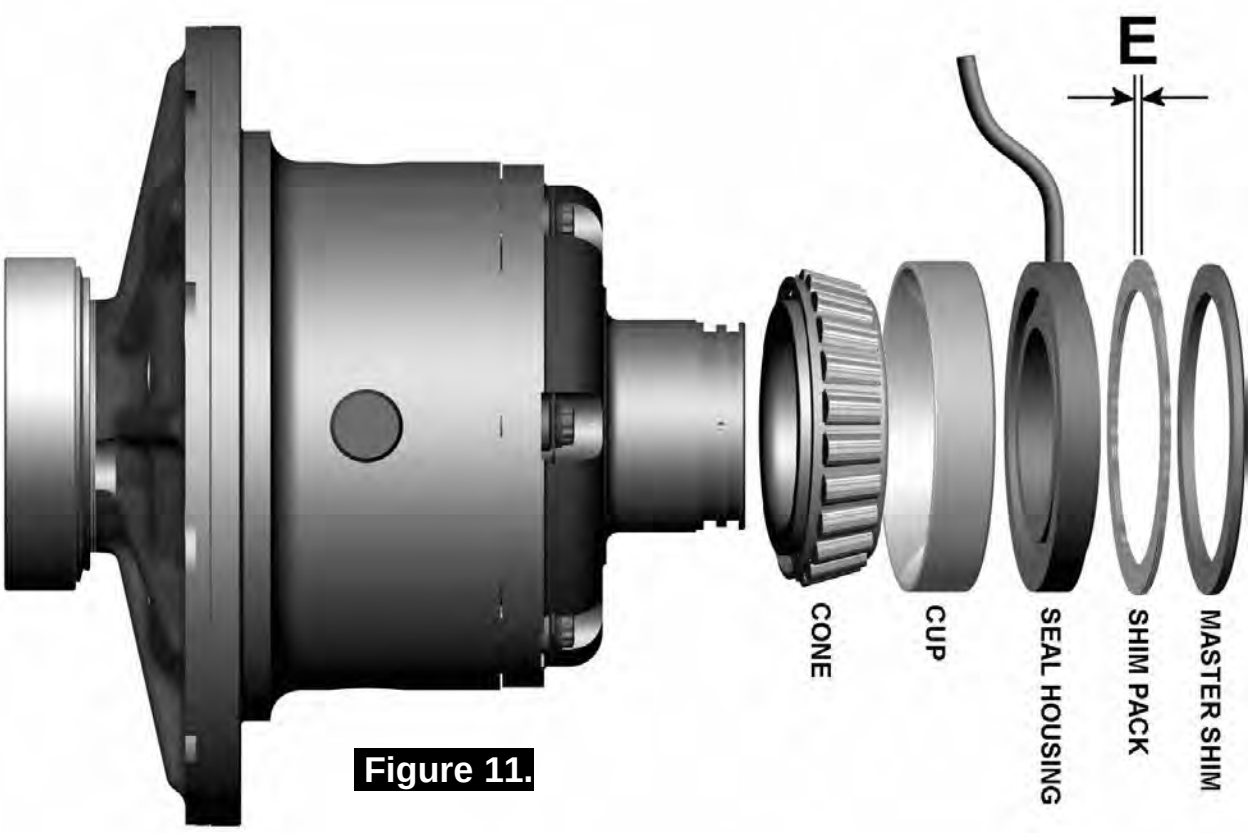

Figure 11.

☐ Slide the seal housing into place against the bearing cup (stepped side out).

NOTE : **The grooves in the bearing journal under the seal housing, will house the O-rings in the final assembly but they will not be installed now to avoid damage to the O-rings.**

☐ Install the supplied master shim onto the seal housing.

NOTE : **The shim pack cannot be installed at this time as the required thickness (shown as 'E' in Figure 11.) has yet to be determined.**

4 Installing the Air Locker

- ☐ Hold the bearing cup in place on the ring gear side.
- ☐ Holding the master shim and tapered roller bearing cup in place at each end, insert and hold the *Air Locker* into the differential housing with the seal housing tube pointing straight out of the housing.
- ☐ Install one bearing cap on the ring gear side. The bearing cap on the seal housing side will need to be drilled or slotted as clearance for the seal housing tube.
- ☐ Install the bearing cap bolts finger tight.
- ☐ Push the *Air Locker* hard across to the ring gear side, and measure the gap (end float) between the master shim and the housing with a feeler gauge.
- ☐ Consult your vehicle manufacturer's service manual to determine the carrier bearing pre-load amount specified for your vehicle.
- ☐ Add the specified pre-load amount to the measurement taken with the feeler gauge to determine a shim amount for '**E**' in Figure 11.

PRE-LOAD + END FLOAT = SHIM PACK

- ☐ Select suitable shims from the supplied shim kit to make up a shim pack of this thickness.
- ☐ Remove the *Air Locker* and assemble the shim pack onto the seal housing spigot behind the master shim (Figure 11.).
- ☐ Spread the differential housing again (Refer to section 2.6).

NOTE : **If the carrier is too difficult to install with the added shim pack then the spreader tension may need to be increased. <u>Do not spread the housing more than 0.50mm [0.020"].</u>**

- ☐ Reinstall the *Air Locker* as before (i.e., with only one bearing cap).
- ☐ Release all spreader tension.

4.6 Approximating the Backlash for Tube Position

If the backlash is not close enough to the specified amount, the tube position cannot be accurately measured to modify the bearing cap for tube clearance. This must be checked before hand.

- ☐ Set a depth indicator on one of the ring gear teeth as in figure 12.
- ☐ While supporting the pinion gear by holding the drive shaft, rotate the differential in both directions while observing the maximum variation in depth from the indicator (i.e., the highest value minus the lowest value).
- ☐ Make sure backlash is less than 0.5mm.

NOTE : **This backlash value is for the tube position only and will not be used for final assembly.**

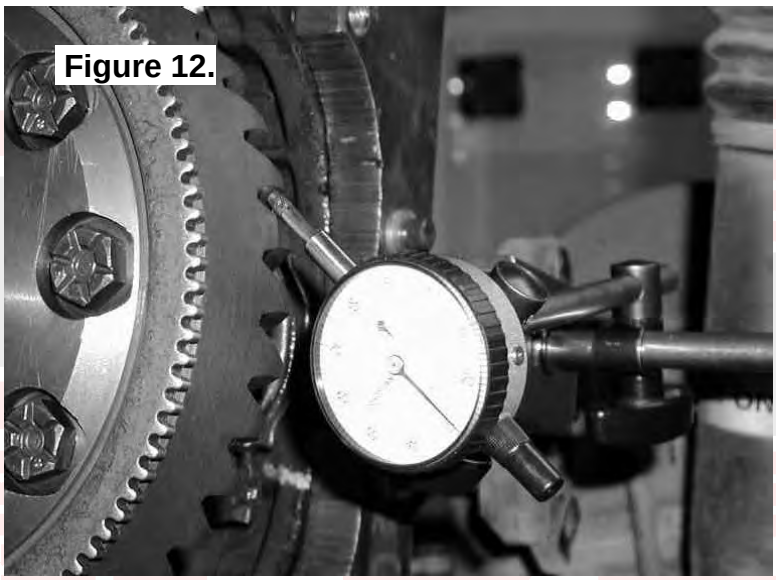

Figure 12.

4.6.1 Re-Shimming the Backlash

NOTE : **This step is only necessary when adjusting for incorrect backlash.**

- ☐ Reapply the spreader to the differential housing.
- ☐ Remove the bearing cap.
- ☐ Remove the differential.
- ☐ To increase the amount of backlash, reduce the shim thickness '**D**'. (Fig.4.) and increase the shim thickness '**E**' (Fig.11.) by the same amount. Reverse this step to decrease the backlash.
- ☐ Remount the differential as before.
- ☐ Release spreader tension.
- ☐ Re-check backlash.

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4.7 Modifying the Bearing Cap

A clearance for the seal housing tube must be made in the bearing cap.

4.7.1 Marking the Tube Position

With the *Air Locker* in place and less than 0.5mm of backlash, an accurate measurement for the seal housing tube clearance can be made.

NOTE : **Take time and double check when taking your measurements, as bearing caps are custom fitted to the axle housing and cannot be replaced.**

☐ With the seal housing tube pointing straight out, measure the distance from a fixed position inside the differential housing to the center of the seal housing tube. (Fig.13.)

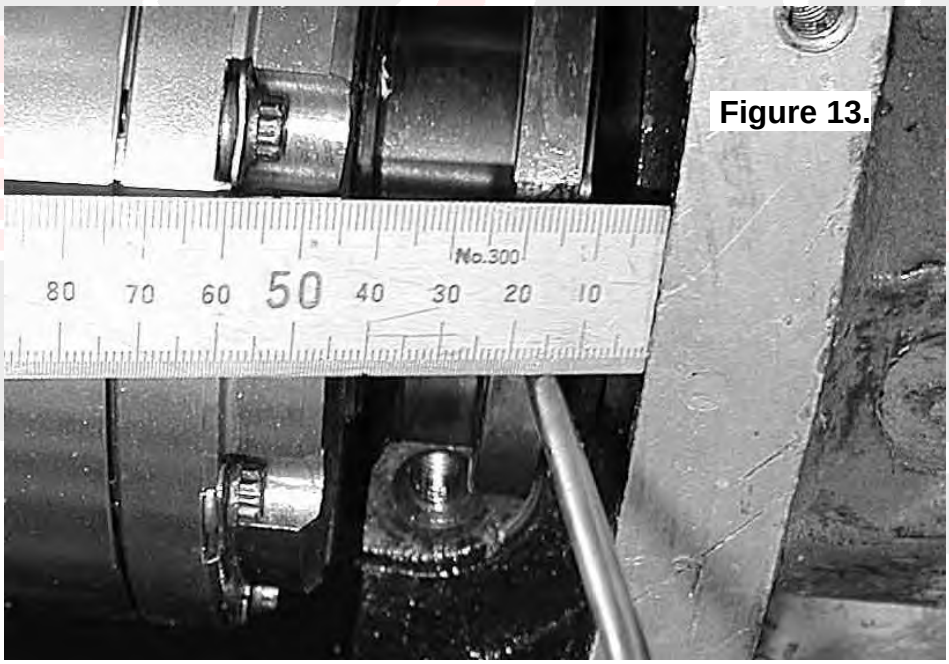

Figure 13.

☐ Record your findings and recheck for accuracy.

☐ Remove the bearing cap from the ring gear side of the differential.

☐ Remove the *Air Locker* from the differential housing.

☐ Install the seal housing side bearing cap and hand-tighten the bearing cap bolts.

4 Installing the Air Locker

NOTE : **It is very important to make sure the punch marks made on the differential housing while removing the differential are matched to the punch marks on the bearing cap. <u>The bearing cap must be replaced exactly as it was removed.</u> (Refer to section 2.4)**

- ☐ Measure to the bearing cap from exactly the same position on the differential housing that you took the previous measurements from. (Fig.14.)
- ☐ Mark the tube position where the clearance is to be made for the seal housing tube with a center punch.

Figure 14.

- ☐ Remove the bearing cap from the differential housing.
- ☐ Measure the distance from the center punch mark made on the bearing cap to the closest edge of the bearing cap.
- ☐ If the center punch mark is greater than 5mm [3/16''] from the closest edge of the bearing cap, it is recommended that a small hole be drilled through the bearing cap (Section 4.7.2). If less than 5mm [3/16''] from the edge it is recommended that a notch is filed into the side of the bearing cap to avoid break-through while drilling (Section 4.7.3).

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4.7.2 Drilling the Bearing Cap

☐ Hold the bearing cap steady for drilling in a soft jawed vise clamp.

NOTE : **Do not apply too much clamping pressure with the vise. The bearing cap may be damaged.**

☐ Using a pedestal drill, drill a 5mm [3/16''] hole through the bearing cap where the seal housing tube hole has been marked. (Fig.15.)

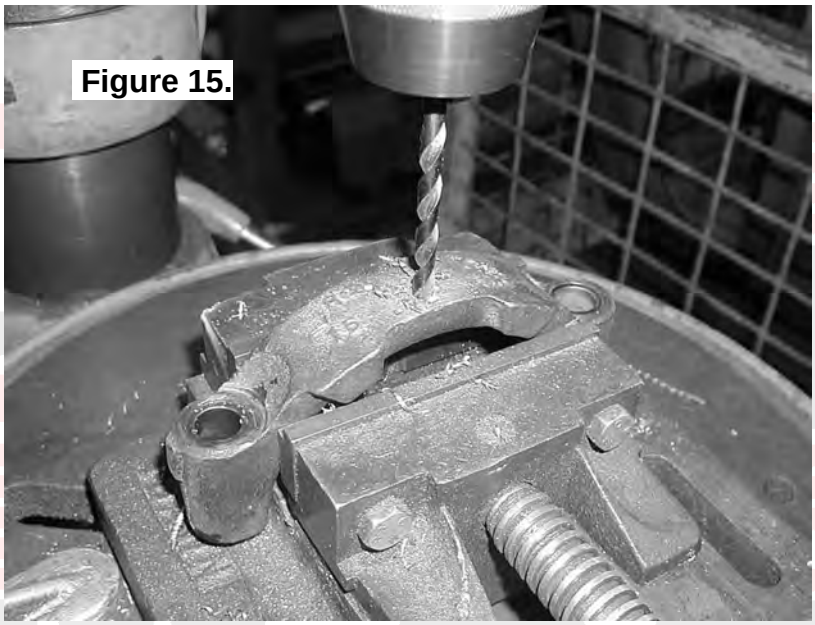

Figure 15.

☐ Remove the bearing cap from the vise, turn it upside down, and re-clamp it in the vise.

☐ The drilled hole must be chamfered approximately 3mm [1/8"] to remove any sharp edges that may chip-off and fall into the housing. (Fig.16.)

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Figure 16.

4.7.3 Notching the Bearing Cap

- ☐ Use a soft jawed vise clamp to hold the bearing cap steady.
- ☐ Using a 6.35mm [¼''] rat-tailed file. File out a notch in the bearing cap from the closest edge until an adequate notch has been cut around the position of the punch mark. (Fig.17.).

Figure 17.

- ☐ File a chamfer around the inside edge of the notch to remove any sharp edges from the notch that may chip-off and fall into the housing.

4.8 Air Locker Final Assembly

4 Installing the Air Locker

- ☐ Remove the seal housing, shim pack, and master shim, and clean all parts of the differential assembly. It is very important to make sure the seal housing grooves are free from any contaminants (eg: water, dirt, metal fillings, etc.)
- ☐ Lubricate the O-rings with oil (prior to assembly), then stretch them over the bearing journal and release them into the grooves.

NOTE : **Do not roll the O-rings onto the seal housing as this will damage them.**

- ☐ Place the bearing cups onto their respective bearing cones.
- ☐ Install the seal housing over the O-rings by gently applying a downward twisting motion. This will allow the O-rings to gently engage.
- ☐ Assemble the shim pack and master shim.
- ☐ Point the seal housing tube straight out of the housing, hold the shims and tapered roller bearing cups in place, and insert and hold the *Air Locker* into the differential housing.
- ☐ Install the bearing cap on the ring gear side.
- ☐ Check to see if the bearing cap on the seal housing side fits over the tube without fouling.

NOTE : **Do not forget to check the bearing caps are turned the correct way around.**

- ☐ Install all bearing cap bolts and torque to manufacturer's specs.

4.9 Final Backlash Checking

- ☐ Relieve all tension on the housing spreader.
- ☐ Tighten all bearing cap bolts with a torque wrench to the torque specified in your vehicle manufacturer's service manual.
- ☐ Set a depth indicator on one of the ring gear teeth as in Figure 18.
- ☐ While supporting the pinion gear by holding the drive shaft, rotate the differential in both directions while observing the maximum variation in depth from the indicator (i.e., the highest value minus the lowest value). This value is referred to as the ring and pinion backlash.
- ☐ Rotate the differential center 90° and measure again for accuracy.

ARB AIR LOCKING DIFFERENTIALS

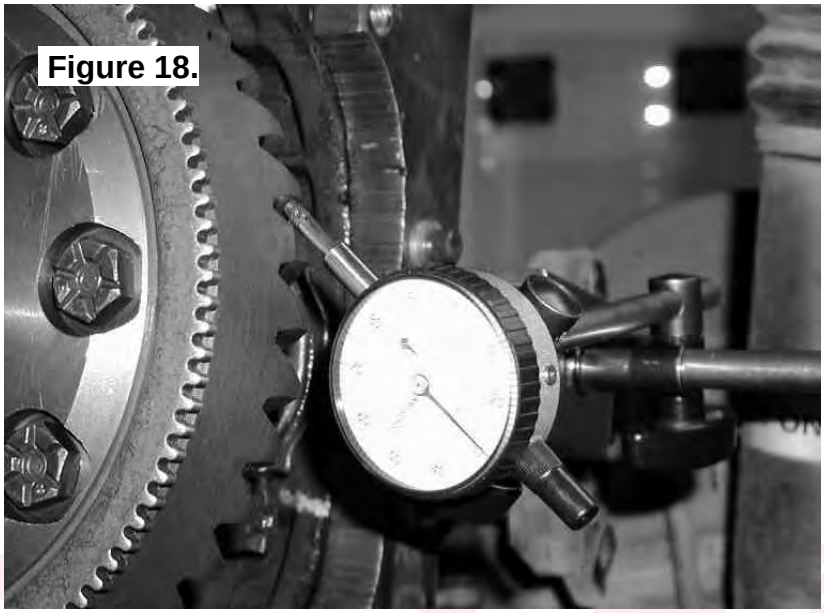


Figure 18.

☐ Refer to your vehicle service manual for the specified maximum and minimum amounts of backlash. If the backlash is not within the specifications then the differential will have to be removed and re-shimmed.

4.9.1 Re-Shimming the Backlash

NOTE : **This step is only necessary when adjusting for incorrect backlash.**

☐ Reapply the spreader to the differential housing.

☐ Remove the bearing caps.

☐ Remove the differential.

☐ To increase the amount of backlash, reduce the shim thickness '**D**' (Fig.5.) and increase the shim thickness '**E**' (Fig.11.) by the same amount. Reverse this step to decrease the backlash.

☐ Remount the differential as before.

☐ Release spreader tension.

☐ Check backlash again as before.

4.10 Profiling the Seal Housing Tube

☐ Without using sharp, jagged tools such as pliers (usually your hands are the best tool for this job), bend the seal housing tube so that it closely follows the profile of the differential housing and protrudes through the bulkhead port in the differential housing. (Fig.19.)

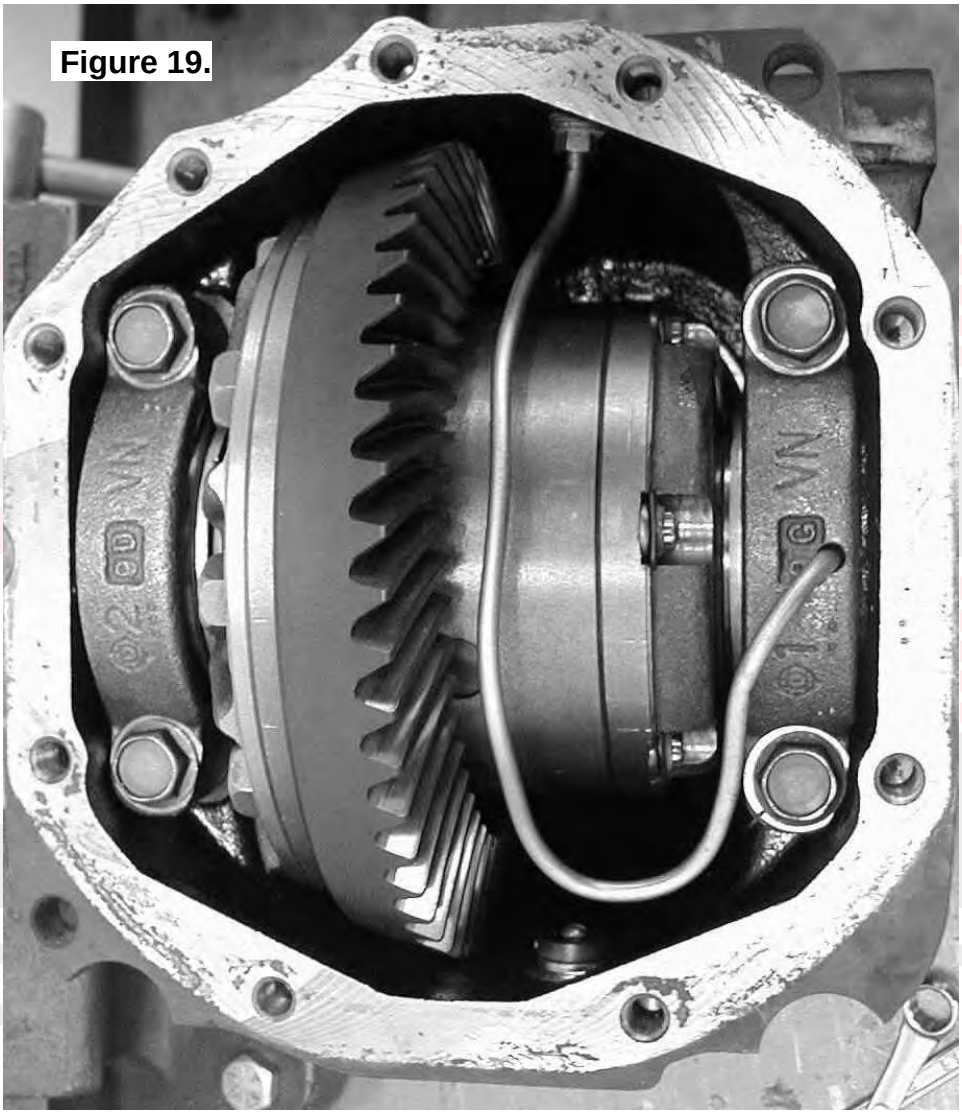


Figure 19.

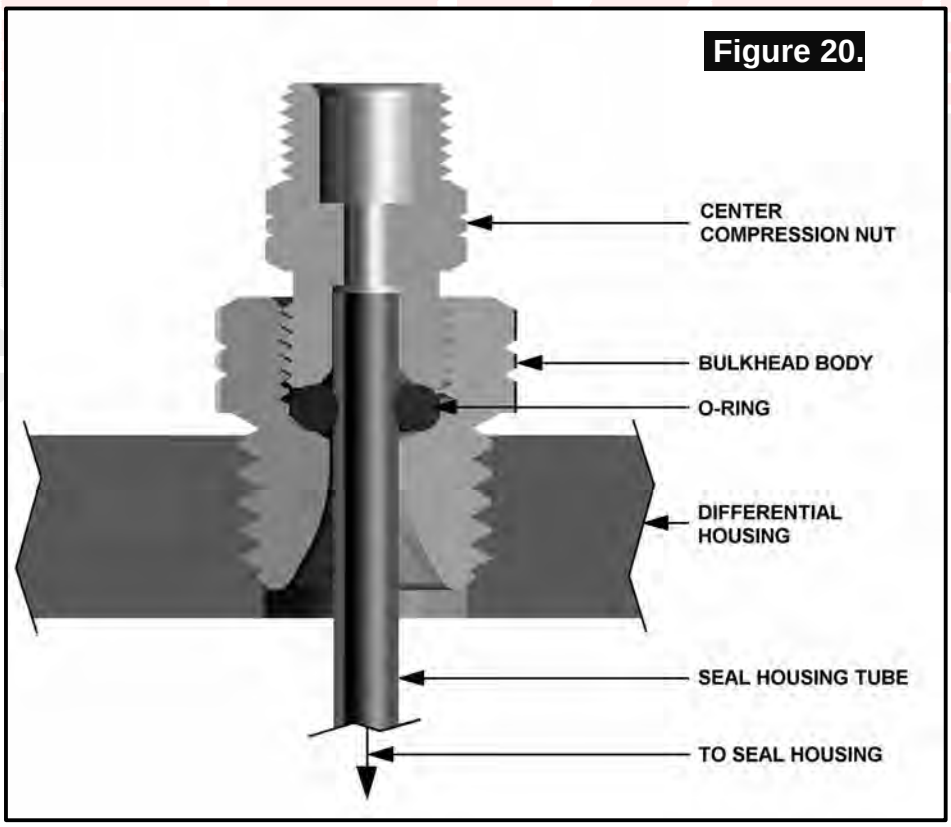
☐ Check that the contour of the tube will not interfere with the ring gear, differential, or the cover plate.

4.11 Setting Up the Bulkhead Fitting

- ☐ Apply thread sealant to the threads of the bulkhead body.
- ☐ Screw the bulkhead body into the tapped hole, and tighten.
- ☐ Wipe the area clean of any excess thread sealant (inside and outside of the housing).
- ☐ Insert the free end of the seal housing tube into the bulkhead fitting until it protrudes approximately 8mm [5/16”] through the other side.
- ☐ From the outside of the housing, assemble the small O-ring over the top of the short length of seal housing protruding through the bulkhead fitting.
- ☐ While still holding the seal housing tube into the bulkhead fitting, insert the small drilled end of the center compression nut over the extended tube as shown in the assembly diagram (Fig.20.), and screw it into the bulkhead body, and lightly tighten.

NOTE : **Be sure to insert the correct end of the center compression nut into the bulkhead body. The thread has been partially relieved on the bulkhead side of the center compression nut to visually identify its orientation. (Fig.20.)**

Figure 20.



NOTE : **Excessive tightening of the center compression nut is not necessary to form a good seal around the tube and may damage the O-ring, the seal housing tube, or the threads of the compression nut.**

NOTE : **Make sure the seal housing tube is all of the way into the center compression nut while you are tightening.**

4.12 Reinstalling the Axles

Reinstall the axles and brake assembly according to the guidelines set forth in your vehicle manufacturers service manual.

NOTE : **Be careful not to damage the axle oil seals with the spline of the axle when inserting them.**

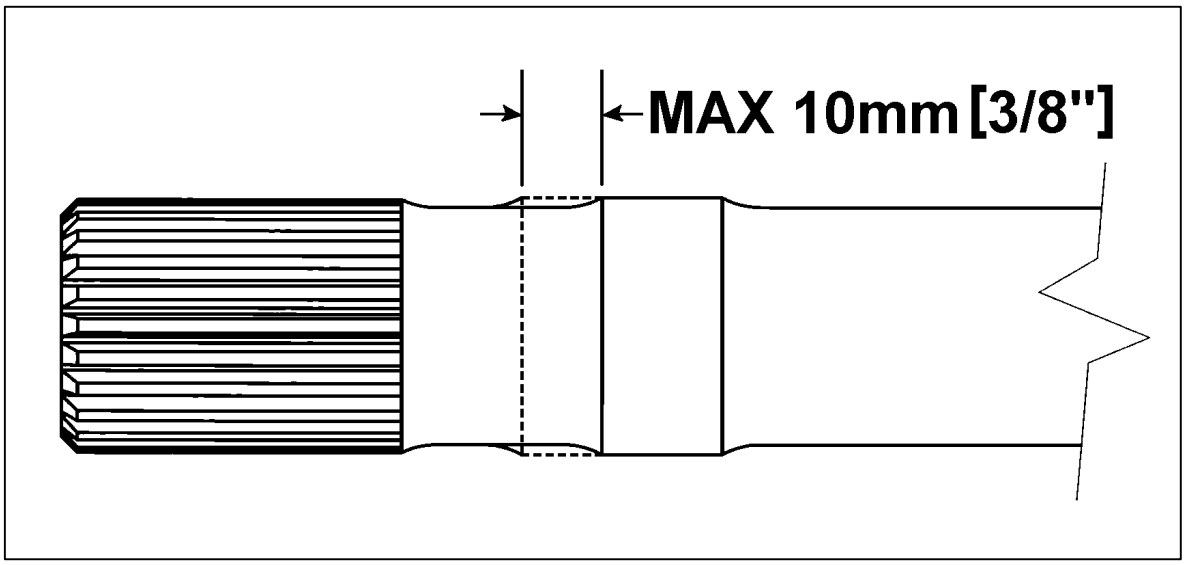
NOTE : **The axles in the two following sections require special consideration at the time of re-assembly. Please determine if they apply to your assembly and follow them accordingly.**

4.12.1 Nissan MQ Patrol Front Differential

NOTE : **This section applies to the front differentials of Nissan MQ Patrols only. Both axle shafts are to be modified as described below.**

☐ The left-hand front axle must have part of the raised section machined away to prevent the axle shaft from fouling the *Air Locker*. The necessary modification is shown in Figure 21.

ARB AIR LOCKER LOCKING DIFFERENTIALS



IMPORTANT:
Ensure that material is only removed from the section shown in the sketch above. If too much is removed, the oil seal may allow differential oil to leak into the wheel hub.

☐ To prevent the end of the right hand front axle shaft from bottoming out on the thrust block, it must be shortened by 10mm.

NOTE : **To be safe you should try the axles in position first to make sure they have not already been modified.**

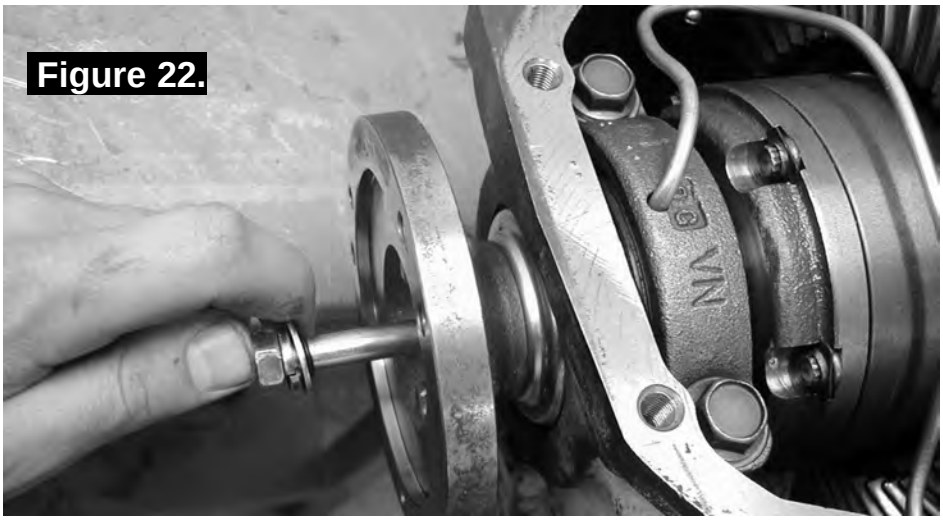
4.12.2 Nissan IFS R200A Differential

NOTE : **This section applies only to the front differentials of Nissan IFS vehicles that use a single bolt to secure the short axle stub into the differential side gear.**

☐ Insert the axle stub as far as it will go.

☐ Insert and hand tighten the retaining bolt into the center of the axle stub. (Refer Fig.22.)

4 Installing the Air Locker



☐ Check that the axle stub turns freely.

IMPORTANT:

Any binding or stiffness could mean that the threaded thrust block was not seated fully or was not seated straight. If this is the case then the thrust block position must be corrected in order to correctly set up the Air Locker and to prevent damage to the Air Locker and to the axle stub.

☐ To correct the thrust block position, pull the trust block into its seat in the side gear spline using a slide hammer on the axle stub or by using a large flat washer over the end of the bearing journal and pulling the thrust block into place with the bolt.

☐ Once the axle stub is turning freely while the bolt is hand tight, re-tighten the bolt using a torque wrench according to the torque specification in your vehicle manufacturer's service manual.

☐ Again make sure the axle stub is turning freely.

ARB LOCKING DIFFERENTIALS

5 Installing the Air System

5.1 Mounting the Solenoid

5.1.1 Connection to an ARB Air Compressor (Fig.23.)

- ☐ Remove one of the 1/8” BSP plugs from its port in the compressor tank.
- ☐ Apply Teflon paste to the nipple (1/8” X 1/8” BSP) and insert it into the port and tighten.
- ☐ Apply Teflon paste to the free end of the nipple.
- ☐ Assemble the inlet port side of the solenoid (stamped with a ‘1’) onto the nipple and tighten. The solenoid should be rotated into a position that does not obstruct any other ports on the compressor tank.

NOTE : **The solenoid exhausts compressed air through the center of the black retaining cap when the *Air Locker* is disengaged. Make sure this orifice cannot be obstructed.**

- ☐ Apply Teflon paste to the threads of the 5mm push-in fitting and assemble it into the solenoid outlet port (stamped “2”) and tighten.

ARB

Air Compressor

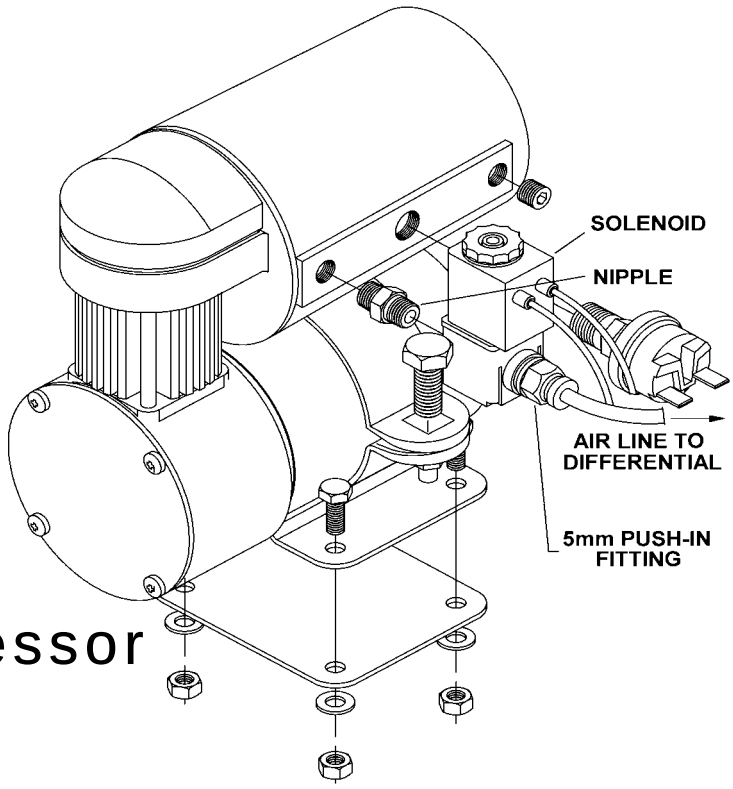


Figure 23.

5.1.2 Connection to an Alternate Air Source

For ease of installation, quality of air supply, and a high level of dependability from your *Air Locker(s)*, ARB strongly recommends use of a genuine ARB Air Compressor, however, the *Air Locker* air system can be operated on any alternate air source that meets each of the following guidelines:

- ☐ Must supply a minimum of 85PSI [586kPa].
- ☐ The supply must never exceed 105PSI [724kPa].
- ☐ The Air source should have a tank capacity that enables it to actuate the *Air Locker*(s) in one charge so that no hesitation is experienced when locking one or two differentials.

HINT : **A good way to insure that you have the necessary capacity is to make sure you can engage, disengage, and then reengage your *Air Locker*(s) without the air source having to regenerate (e.g., without the compressor turning on to refill the tank).**

- ☐ Must supply clean air, free of rust, dirt, water, or other foreign matter.
- ☐ Must match the 1/8” BSP porting of the *Air Locker* solenoid.

☐ Mount solenoid within close proximity of the air supply and secure it from the effects of vibration and shock.

☐ Connect the air supply to the 1/8” BSP inlet port of the solenoid (stamped “1” on the solenoid body) using thread sealant.

IMPORTANT :

ARB cannot warrant your *Air Locker*(s) against damage caused as a result of using an alternate air supply. If you have any doubts as to the suitability of your air system to use in an *Air Locker* system, consult your ARB distributor.

5.2 Running and Securing the Air Line

The path taken by the air line from your air source (i.e., compressor) to your *Air Locker* is unique to your vehicle and the position of your air source. Plan ahead carefully when running the air line and always follow these guidelines:

- ☐ Account for axle travel when running the line from the axle to a fixed point on the vehicle. Leave enough slack in the air line to allow for maximum suspension travel in both directions.
- ☐ Avoid leaving large lengths of air line hanging underneath the vehicle where they may get tangled on rocks, sticks, etc.

HINT : **Cable tying the air line to one of your flexible brake lines will account for axle travel and should help keep your line from getting snagged.**

- ☐ Run the air line all the way from the compressor to the differential before trimming either end of the line to length. This will save complications that may arise if the air line has to be removed.
- ☐ Make sure the line does not contact sharp edges or abrasive surfaces that may damage the air line over time.
- ☐ Do not run the air line around tight bends which may kink the air line and restrict or block the air flow.
- ☐ Keep the air line well away from your vehicle's exhaust components. Air lines will melt if subjected to extreme heat.
- ☐ Do not run more air line than necessary. Excess line volume created when coiling the left over hose, using unusually large diameter hose, etc., will increase drain on the compressor tank resulting in the compressor running more often than needed.
- ☐ Support the air line by tying it back with cable ties wherever possible.
- ☐ At the solenoid end of the air line, trim the line to length with a sharp knife.

NOTE : **To remove the air line from the push-in fitting; while holding the flange of the fitting out, push the air line into the fitting as far as possible, then press the flange inward, then pull the air line free of the fitting.**

5 Installing the Air System

☐ To attach the air line to the push-in fitting of the solenoid; insert the line firmly into the fitting, pull outward on the flange of the fitting while holding the line as far into the fitting as possible, and then gently pull outward on the air line to clamp the line in place.

5.3 Connection to the Bulkhead Fitting

☐ Trim the air line to length using a sharp knife.

☐ Insert the support spring over the end of the air line - small end first. (Fig.24.)

☐ Insert the outer compression nut over the air line.

☐ Insert the 5mm [0.197”] ferrule over the end of the air line. Leave approx. 5mm of tubing between the ferrule and the end of the tube.

Figure 24.

☐ Insert the support tube all the way into the end of the air line.

5 Installing the Air System

HINT : **If the support tube is too difficult to insert, place the end of the air line into a cup of boiled water to soften the tubing.**

- ☐ Insert the tube end all the way into the center compression nut.
- ☐ Screw on the outer compression nut and tighten. The ferrule and support tube are now permanently attached.
- ☐ Assemble the support spring over the outside of the outer compression nut.
- ☐ Secure any loose sections of tube with a cable tie.

ARB AIR LOCKER LOCKING DIFFERENTIALS

6 Mounting & Connecting the Electrical System

6.1 Mounting the Actuator Switch(es)

Air Locker actuator switch(es) can be easily panel mounted inside the vehicle in a 21mm x 36.5mm [0.83” x 1.44”] rectangular cutout.

NOTE : **Only attach the cover plate to the face of the switch once the switch has been mounted and wired correctly as the cover plates are designed to be difficult to remove.**

For reasons of safety and for ease of operation, the *Air Locker* actuator switch(es) should be mounted in a location picked to best suit the operator. Make sure you have taken the following points into consideration:

- ☐ Switch(es) MUST be mounted and should never be allowed to simply dangle from the wiring loom during vehicle use.
- ☐ Switch(es) should be within easy reach of the driver. Ideally, any *Air Locker* switch should be able to be operated without physical effort or distraction to the driver.
- ☐ Switch(es) should be mounted within the line of sight of the driver so that switch position (‘ON’ or ‘OFF’) can be visually determined by the rocker position and the illumination state.
- ☐ The position of the switch(es) should best eliminate any possibility of accidental operation by the driver or one of the passengers.
- ☐ Switch cutout position(s) must be located in an area with a minimum of 50mm [2”] of clearance behind the face of the cutout.
- ☐ Switch(es) should not be mounted where they will be exposed to water (e.g., in the lower section of an inner door panel).
- ☐ ARB recommends that you apply the *Air Locker* Warning Sticker (ARB part # 210101) within close visual proximity of the switch location.

NOTE : **If no adequate position can be found on existing dashboard panels, a surface mounted bracket (Fig. 25.) may be purchased from your ARB *Air Locker* distributor to suit 1, 2, or 3 switches.**

ARB AIR LOCKER LOCKING DIFFERENTIALS

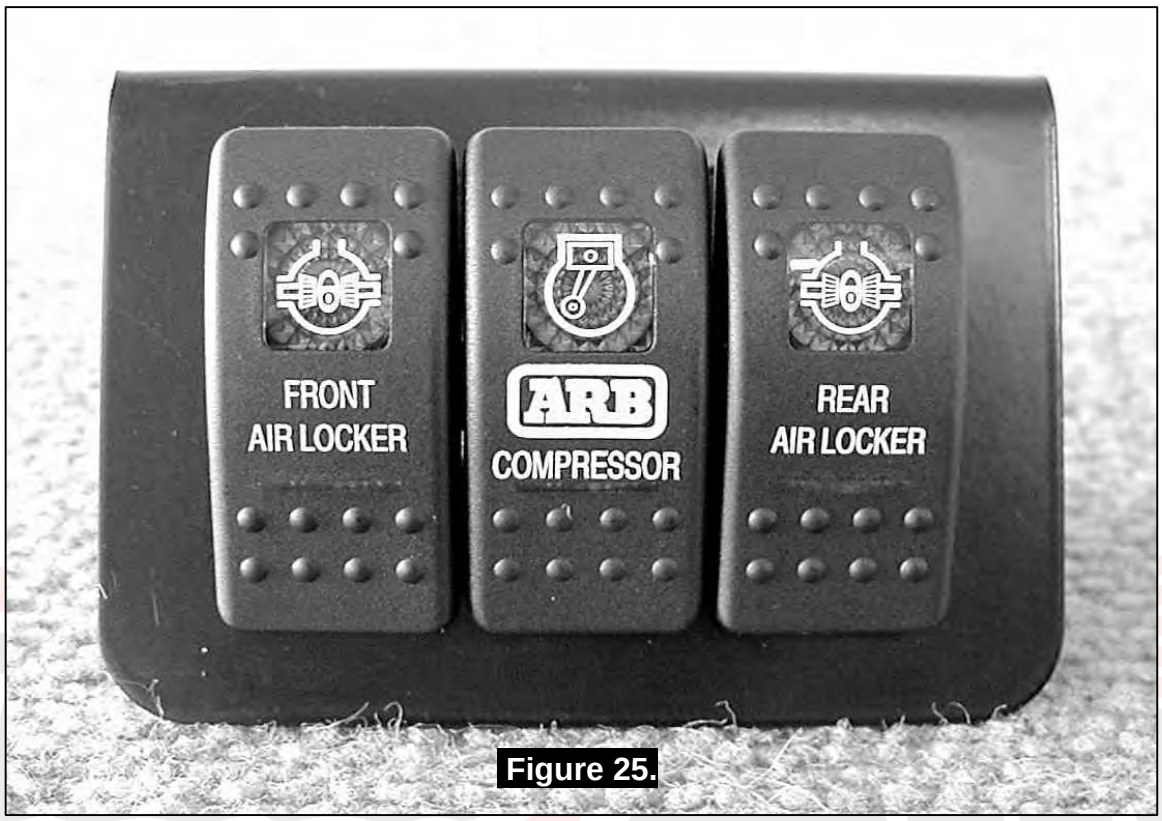


Figure 25.

6.2 Wiring the Actuator System

6.2.1 Connection to an ARB Air Compressor

When wiring the *Air Locker* actuator switch(es) and solenoid(s) to an ARB Air Compressor, all connections can easily be set up directly from the supplied wiring loom. (Fig. 26.)

NOTE : **Refer to your ARB Air Compressor Installation Guide for details on configuring your installation.**

ARB AIR COMPRESSOR WIRING LOOM

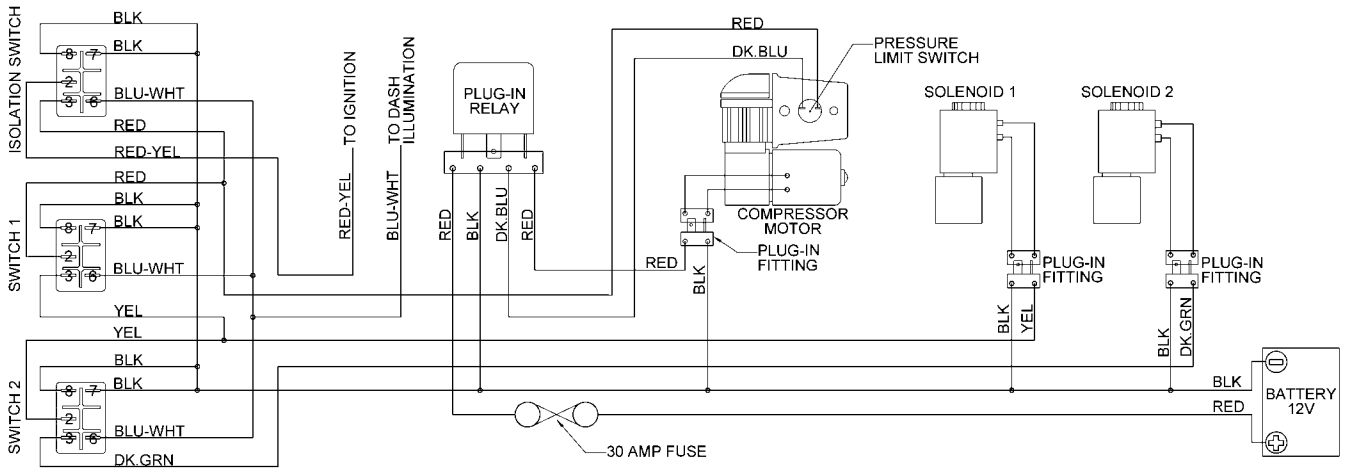


Figure 26.

SWITCH TERMINAL IDENTIFICATION

Figure 27.

LOCKING DIFFERENTIALS

6.2.2 Connection to an Alternate Air Source

When connecting the actuation switch to an alternate air source, the switch(es) should be wired according to figures 28. and 29., depending on whether one or two *Air Lockers* will be installed in the vehicle.

6.2.2.1 Single Air Locker System

- ☐ If only one *Air Locker* is to be installed in the system, the switch and solenoid should be wired according to figure 28. regardless of whether the *Air Locker* has been installed in the front or rear axle of the vehicle.
- ☐ Attach the appropriate switch cover (i.e., 'FRONT' or 'REAR') to the switch.

NOTE : **Refer to Figure 27. for the correct switch terminal identification and switch orientation.**

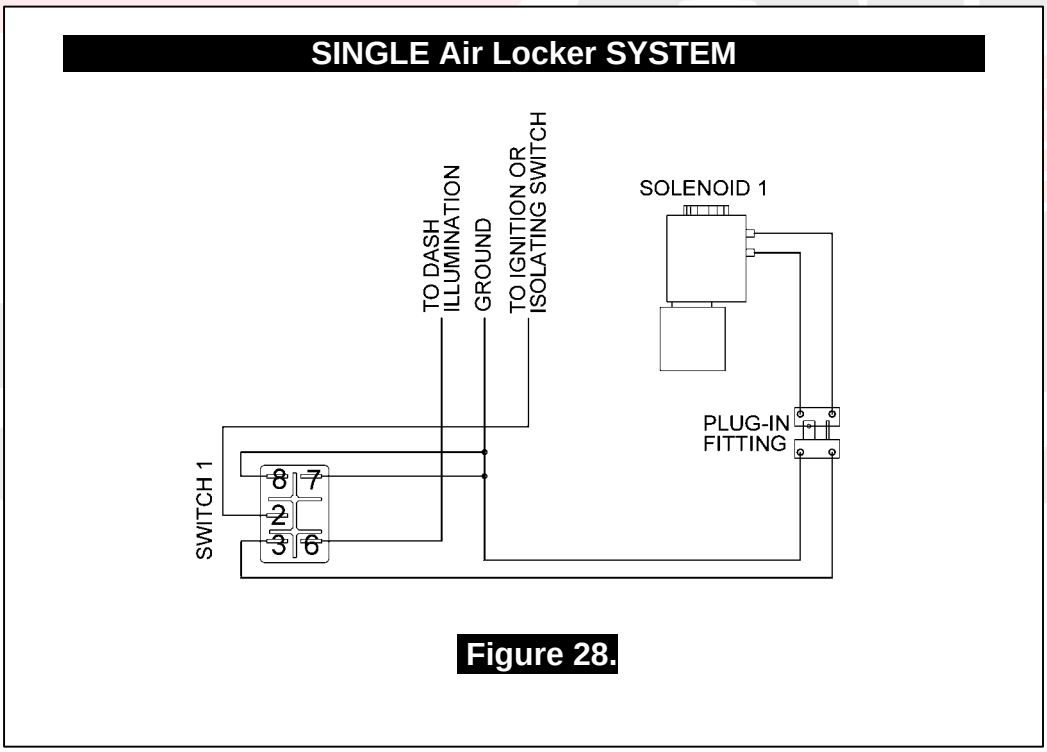


Figure 28.

6.2.2.2 Dual Air Locker System

☐ If two *Air Locker*s are to be installed in the system, ARB recommends that the switches and solenoids be wired according to figure 29. For safety reasons, this configuration allows SOLENOID 2 to be actuated only if SOLENOID 1 is already on.

☐ Attach the “REAR AIR LOCKER” switch cover to SWITCH 1, and the “FRONT AIR LOCKER” switch cover to SWITCH 2.

NOTE : **Refer to Figure 27. for the correct switch terminal identification and switch orientation.**

☐ Configure SOLENOID 1 as the air line leading to the rear axle *Air Locker*, and SOLENOID 2 as the air line leading to the front axle *Air Locker*.

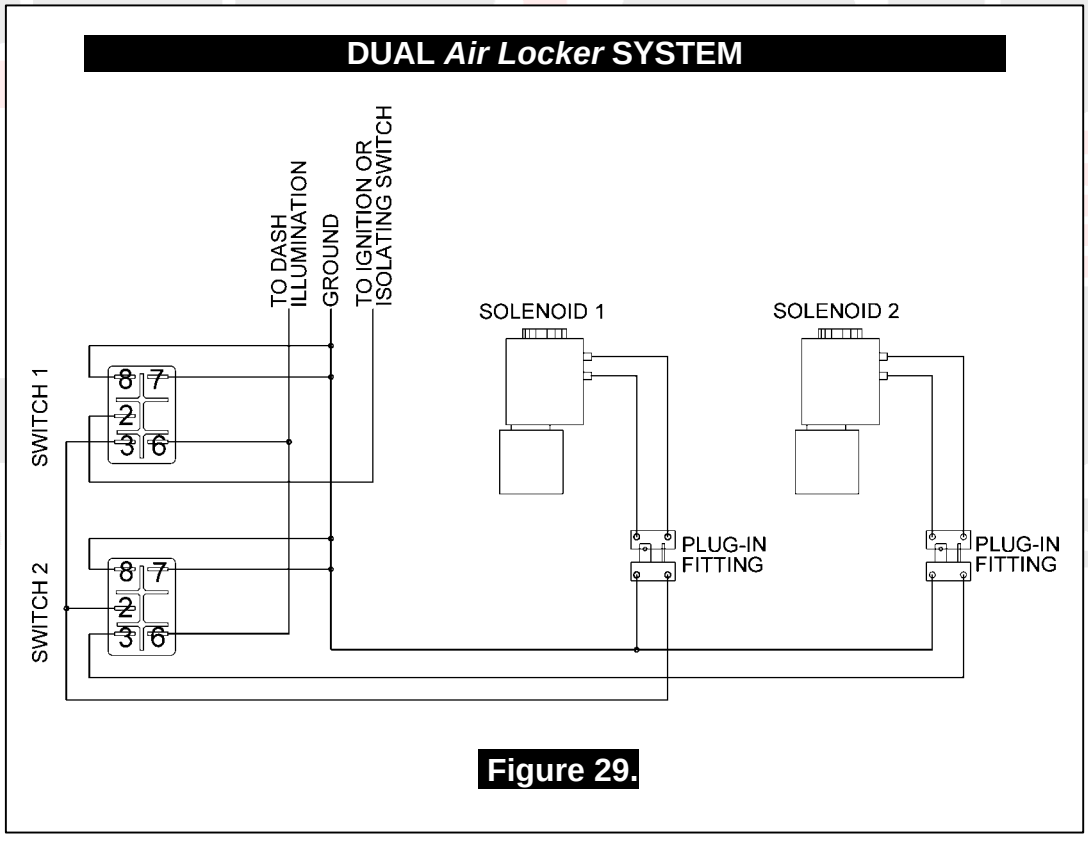


Figure 29.

7 Testing & Final Assembly

7.1 Leak Testing

☐ With the vehicle parked and the engine off, turn the compressor on and wait until the air system is fully charged.

NOTE : **With the *Air Locker(s)* disengaged, the air source (i.e., compressor) should not have to recharge over time. Intermittent recharging without *Air Locker* use usually indicates a leak at the solenoid fittings or at the compressor tank O-ring seal.**

☐ Actuate the *Air Locker*(s).

☐ The compressor should not come on again for a period of at least 15min. Air system recharging within that time period would indicate that a leak is present in the system.

NOTE : **If an alternate air source (e.g., an air cylinder or a belt driven air pump) is used instead of a compressor, the air system will have to be leak tested with a pressure gauge and a shut-off valve in series before the solenoid input.**

☐ If a leak is found to be present, spray a soap and water mixture onto all air fittings in the system while the compressor is fully charged. Bubbles should appear at any leak points.

☐ Check that leaky fittings have been adequately tightened.

☐ Disassemble, clean threads, and reapply thread sealant if leaking persists.

7.2 Testing the Air Locker Actuation

To test that your air system, electrical system, and your *Air Locker* differential is functioning correctly:

☐ Support the vehicle such that the wheels are free to rotate (e.g., on axle stands, a chassis hoist, etc.)

☐ Leave the parking brake off, the transmission in neutral, and the *Air Locker* switch ‘OFF’.

7 Testing & Final Assembly

- ☐ Turn the ignition to the 'ON' position (leaving the motor off). The large illuminating symbol on the *Air Locker* switch cover should be 'OFF'.
- ☐ Turn the compressor (or alternate air source) on to charge the air supply up to its maximum pressure.
- ☐ Rotate one wheel by hand.
- ☐ The wheel should rotate freely and the opposite wheel should be turning in the opposite direction without any resistance or mechanical noise from within the differential.
- ☐ Turn the *Air Locker* switch to the 'ON' position. The illuminated symbol on the switch cover should light up.
- ☐ Rotate the same wheel again.
- ☐ Both wheels should rotate together.
- ☐ Turn the switch off again.
- ☐ Rotate the same wheel.
- ☐ The wheels should again rotate in opposite directions.

7.3 Re-Sealing & Filling the Differential

NOTE : **Consult the *ARB Air Locker Operating & Service Manual* for recommendations on differential lubricant specifications.**

- ☐ Replace the differential cover using gasket sealant or a new standard differential cover gasket for your make of vehicle.
- ☐ Refill the differential until level with the filler hole.
- ☐ Rotate the differential center 2 full turns.
- ☐ Check the oil level and add oil if necessary.
- ☐ Replace filler plug (apply thread sealant to filler plug before inserting if it is a threaded type plug).
- ☐ Wipe differential housing clean of any oil or grease which may collect dirt or other abrasive particles.

ARB AIR LOCKING DIFFERENTIALS

7 Testing & Final Assembly

7.4 Post-Installation Check List

Now that the *Air Locker* installation has been completed, ARB recommends that you take the time to complete the following check list just to insure that you haven't missed any of the vital steps.

- ☐ The air system has been leak tested.
- ☐ Thread locking compound was used on the ring gear bolts.
- ☐ All torque settings comply with the vehicle manufacturer's specs and were set with an accurate torque wrench.
- ☐ Differential fluid complies with ARB recommendations and has been filled to the correct level.
- ☐ All air lines and wiring have been securely cable tied to resist snagging.
- ☐ Switch(es) have been securely mounted within operator reach, yet well away from danger of accidental engagement.
- ☐ Switch(es) function properly and illuminate to indicate that *Air Locker*(s) have been engaged.
- ☐ All operators who are to use the *Air Locker* have read, and fully understand the *ARB Air Locker Operating & Service Manual.*
- ☐ The *Air Locker* Warning Sticker has been located within close proximity of the actuator switch(es).

INSTALLATION PERFORMED BY: _____

DATE OF INSTALLATION: _____

ODOMETER READING: _____

ARB AIR LOCKER SERIAL No: _____

ARB AIR LOCKER LOCKING DIFFERENTIALS

8 Parts List

8.1 Exploded Assembly Diagram

(See itemized parts list overleaf)

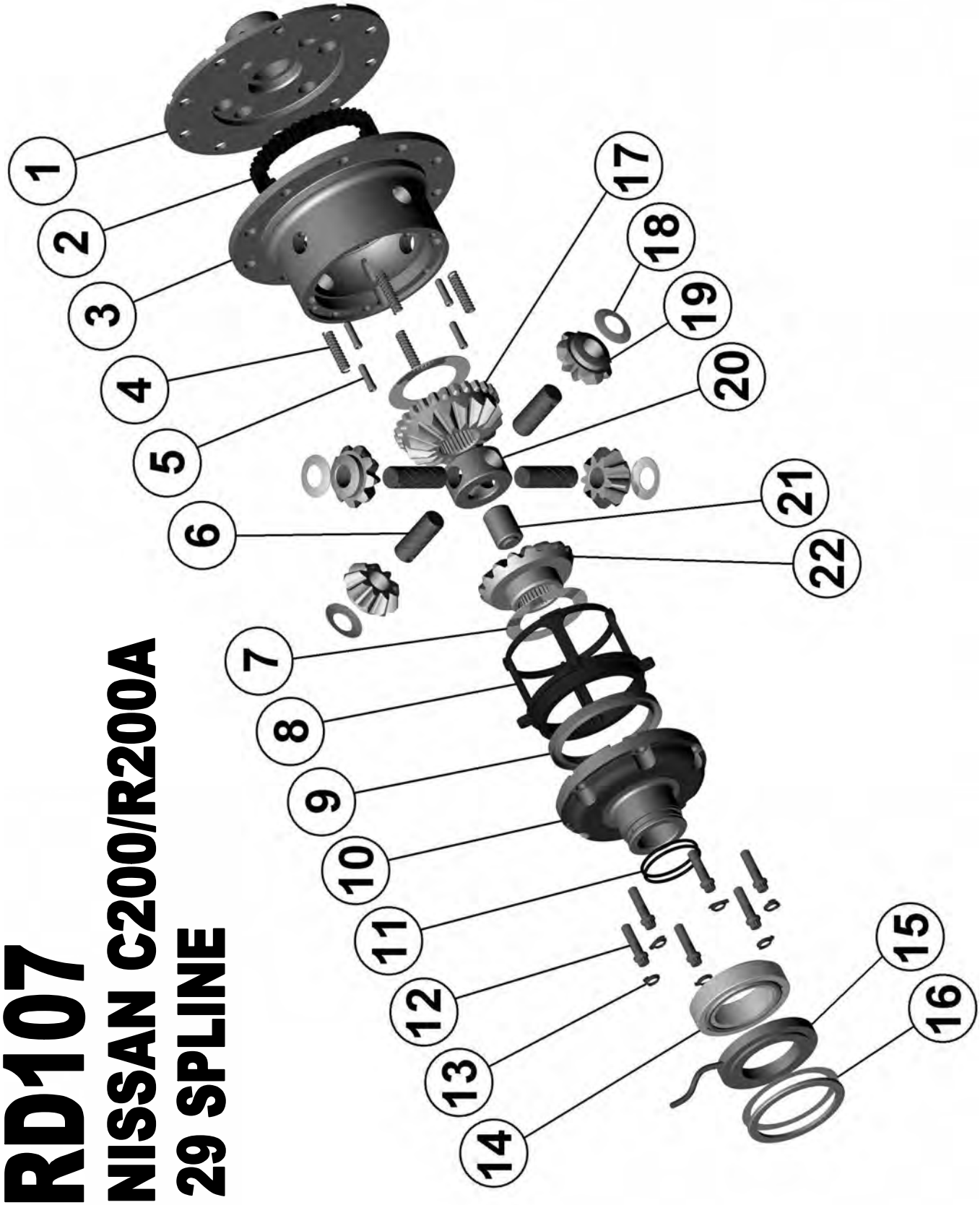


Figure 30.

8 Parts List

8.2 Itemized Parts List

(See exploded diagram figure 30.)

AIR LOCKER MODEL No. : RD107			
ITEM #	QTY	DESCRIPTION	PART #
01	1	FLANGE CAP	020103
02	1	CLUTCH GEAR	050102
03	1	DIFFERENTIAL CASE	010105
04	4	PISTON SPRING	150101
05	2	CROSS SHAFT RETAINING PIN	120102
*	2	CROSS SHAFT RETAINING PIN	120302
06	4	SHORT CROSS SHAFT	060308
07	2	SIDE GEAR THRUST WASHER	151003
08	1	PISTON (Polyamide)	040103
09	1	BONDED SEAL	160701
10	1	CYLINDER CAP	030123
11	2	SEAL HOUSING O-RING	160208
12	6	CYLINDER CAP RETAINING BOLT	200205
13	6	TAB WASHER – 8mm	150401
14	-	TAPERED ROLLER BEARING	NOT SUPPLIED
15	1	SEAL HOUSING	080802
16	1	SHIM KIT	SHK004
17	1	SPLINED SIDE GEAR	130307
18	4	PINION THRUST WASHER	151101
19	4	PINION GEAR	140101
20	1	SPIDER BLOCK	070101
*	1	THRUST BLOCK (THREADED)	110401
21	1	THRUST BLOCK	110501
22	1	SIDE GEAR	130107
*	1	BULKHEAD FITTING (O-RING TYPE)	170105
*	1	PUSH-IN FITTING,5mm (R1 5 1/8”)	170201
*	1	AIR LINE (5mm DIA X 6m LONG)	170301
*	1	NIPPLE, 1/8” BSP,MALE TO MALE	170501
*	1	SOLENOID VALVE	180103
*	1	ACTUATOR SWITCH	180209
*	1	SWITCH COVER (REAR)	180211
*	1	SWITCH COVER (FRONT)	180210
*	10	CABLE TIE	180301
*	1	WARNING LABEL	210101
*	1	BUMPER STICKER	210102
*	1	OPERATING & SERVICE MANUAL	210200
*	1	INSTALLATION GUIDE	2102107

* *Not illustrated in exploded view.*